43. Cancelled. ~~The method of claim 42 wherein the first and second circuits share at least one common terminal.~~

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44. (Amended) The method of claim ~~43~~ 42 wherein closing the second circuit shorts the first circuit.

45. (Amended) The method of claim ~~43~~ 42 wherein sensing temperature with an electrical temperature sensor portion of a first circuit is operated after positively closing the second circuit.

REMARKS

Claims 1-45 remain in the case. Claims 25-31 and 36-41 stand allowed. Claims 1, 13, 22, 42, 44 and 45 are amended. Claims 12, 23 and 32 are re-written in independent format. Claim 43 is cancelled.

Claim Rejections Under 35 USC § 112

Claims 12, 23, 24 and 32-35 were rejected under 35 USC § 112, first paragraph.

Claims 12, 23 and 32 are re-written in independent format, whereby any real or perceived contradictions relative to respective base claims are eliminated. No new matter is added.

Claim Rejections Under 35 USC § 102

Claims 1-5, 8-11, 13-21 and 42-45 were rejected under 35 USC § 102(b) as being anticipated by U.S. Pat. No. 4,306,210 to Saur.

The invention recited in claim 1 is patentable over Saur which teaches an "electrical switch assembly including two separate, temperature-dependent electrical switches, one of the electrical switches being substantially mechanically acting and the second of the electrical switches being a non-mechanical, solid-state switch." See, Abstract.

A principal object of the Saur patent is to provide a temperature-responsive electrical switch containing at least two separate electrical circuits which may be independently switched on and off in dependence of the occurrence of different levels of temperature. Column 1, lines 25-30.

Thus, Saur teaches a single housing having a first mechanical electrical switch and a second semiconductor switch, there being separate electrical contact pins leading to each of the electrical switches. Column 1, lines 31-37.

Accordingly, Saur teaches in FIG. 1 a "two-stage" switch having a first temperature dependent mechanical switching element, *i.e.*, a "snap-switch," constituted by an actuating lever 20 which is pivotably carried by an angled portion 19 of one contact pin 9'. Column 2, line 65-column 3, line 3.

The actuating lever 20 is connected with a contact post 29 which alternates between a first electrically opened position and a second closed position in which it contacts the housing 1 through an electrically conducting contact 25 part of an electrically conducting closure member 4 held in the housing 1 by the annular lip 29. Column 3, lines 3-15.

When the switch temperature is exceeded, the contact post 29 switches over to its second position against the contact 25, thereby establishing electrical communication between the pin 9' and the housing 1, whereby the snap-switch closes. Column 3, lines 28-35.

A temperature-dependent semiconductor switch 31 constitutes a second independent switch that communicates electrically with a second electrical pin 9". Column 3, lines 36-43.

The semiconductor element 31 operates through a contact ring 32 and a closure element 4 to open and close electrical contact between the contact pin 9" and the housing 1. Column 3, lines 44-56.

The snap switch and the semiconductor switch 31 are thus constitute a "two-stage" switch having two separate and independent switches that control separate and independent circuits that are coupled to the first contact pin 9' and the second contact pin 9", respectively, but share the housing 1 as a common terminal.

The construction and function of the other embodiments of the second semiconductor switch 31, as taught by Saur, are all "identical" to the embodiment taught in FIG. 1. See, respectively, column 4, lines 11-14 regarding the teaching of FIG. 2; column 4, lines 15-17 regarding the teaching of FIG. 3; and column 5, lines 1-11 regarding the teaching of FIG. 4.

Therefore, the only teaching of Saur is a "two-stage" switch having a second independent switch, *i.e.* semiconductor element 31.

The invention as presently recited in amended claim 1 is a snap-action thermal switch coupled with an integral electrical temperature sensor. The two switches are coupled to terminals that are electrically isolated from the switch housing. Furthermore, the two switches share at least one of the terminals in common.

The invention recited in claim 1 is distinguished from Saur by reciting a pair of thermal switches having electrically coupled outputs that are electrically isolated from the switch housing.

In contrast, Saur teaches a "two-stage" switch having the semiconductor element 31 coupled as a second independent switch. Column 3, lines 36-43.

Because Saur teaches having the semiconductor element 31 coupled as a second independent switch on a second "separate electrical circuit," the semiconductor element 31 inherently cannot be coupled to an output of the first switch. In contrast, according to the present invention, because the two switches share one of the electrically isolated terminals, an output of the second switch must be coupled to an output of the first switch.

Furthermore, as taught by Saur, the first and second switches are both electrically coupled to ground through the switch housing 1. Column 3, lines 28-35 for the snap-switch; and column 3, lines 44-56 for the semiconductor switch 31.

In contrast, the present invention recited in claim 1 is distinguished from Saur by reciting that both of the two switches are electrically isolated from the housing.

For at least the above reasons, claim 1 is believed to be allowable over Saur.

Dependent claims 2-5 and 8-11 are allowable as depending from allowable base claim 1.

Claims 12, 13, 22, 23, 32 and 42 are different in scope from claim 1. However, the above arguments directed to claim 1 are sufficiently applicable to claims 12, 13, 22, 23, 32 and 42 as to make repetition unnecessary. Thus, for each of the reasons above, claims 12, 13, 22, 23, 32 and 42 are believed to be allowable over the Saur reference.

Dependent claims 14-21 and 44-45 are allowable as depending from allowable base claims 13 and 42, respectively. Dependent claim 43 is cancelled, thereby mooting the rejection.

Claim Rejections Under 35 USC § 103

Claims 6 and 7 were rejected under 35 USC § 103(a) as being obvious over Saur in view of US Pat. No. 5,422,788 to Heinen et al. which teaches means for enhancing adhesion between a heat spreader 15 and a substance 19 to be adhered to the heat spreader by using thermal spray deposition to apply a coating 23 to the heat spreader and applying the substance 19 to the coated heat spreader 15. See, *e.g.*, Abstract.

Dependent claims 6 and 7 depend from base claim 1. The invention recited in claim 1 is patentable over Saur and Heinen, both individually and in combination.

As discussed above, Saur fails to disclose or suggest two thermally activated switches that share at least one of two terminals that are electrically isolated from the switch housing such that an output of the second switch must be coupled to an output of the first switch, as recited in amended claim 1. Rather, Saur teaches having the semiconductor element 31 coupled as a second independent switch on a second "separate electrical circuit" so the output of the semiconductor element 31 inherently cannot be coupled to an output of the first switch.

As is also discussed above, Saur fails to disclose or suggest both of the two switches being electrically isolated from the switch housing, as recited in amended claim 1. Rather, Saur teaches having both the first and second switches being electrically coupled to ground through the switch housing 1. Column 3, lines 28-35 for the snap-switch; and column 3, lines 44-56 for the semiconductor switch 31.

Heinen fails to provide the deficiencies of Saur. Heinen fails to disclose or suggest either (1) the switches sharing at least one of two terminals that are electrically isolated from the switch housing such that an output of the second switch must be coupled to an output of the first switch, or (2) both of the two switches being electrically isolated from the switch housing, both of which are recited in amended claim 1.

For at least the above reasons, claim 1 is believed to be allowable over Saur.

The invention recited in claims 6 and 7 are patentable over Saur and Heinen at least as depending from allowable base claim 1.

Allowable Subject Matter

The Examiner is thanked for advising that claims 25-31 and 36-41 are allowed.

However, the Applicants believe that recitation in claims 25 and 36 of an electrical temperature sensor sharing one or more of first and second terminals in common with respective first and second contacts that are coupled by activation of a disc actuator, with the electrical temperature sensor being structured to provide an output representative of the sensed temperature, is sufficient to overcome the references cited in the Office Action.

The claims now being in form for allowance, reconsideration and allowance is respectfully requested.

For the Examiner's convenience, a clean copy of the claims, including the changes thereto, are provided in an Attachment hereto.

If the Examiner has questions or wishes to discuss any aspect of the case, the Examiner is encouraged to contact the undersigned at the telephone number given below.

Respectfully submitted,

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Attachment Showing Claims With Amended Matter Incorporated

IN THE CLAIMS

1. (Amended) A device, comprising:

a switch housing;

at least two terminals that are both mutually electrically isolated and electrically isolated from the housing;

a positive action thermal switch being electrically coupled to at least two of the mutually electrically isolated terminals and being electrically isolated from the housing; and

an integral electrical temperature sensor being electrically coupled to at least two of the mutually electrically isolated terminals and being electrically isolated from the housing, the integral electrical temperature sensor sharing one or more of the two mutually electrically isolated terminals in common with the positive action thermal switch.

2. The device of claim 1 wherein the positive action thermal switch is a snap-action thermal switch.

3. The device of claim 1 wherein the snap-action thermal switch is structured having a pair of terminals being mutually electrically isolated when the snap-action thermal switch structured in a normally open configuration; and

the integral electrical temperature sensor is electrically coupled to provide an output on the pair of electrically isolated terminals.

4. The device of claim 3 wherein the pair of mutually electrically isolated terminals are shorted together when the device senses an ambient temperature higher than a predetermined set point of the snap-action thermal switch.

5. The device of claim 3 wherein the integral electrical temperature sensor is mounted on an interior surface of the snap-action thermal switch.

6. The device of claim 5, further comprising a bonding agent between the electrical temperature sensor and the interior surface of the snap-action thermal switch.

7. The device of claim 6 wherein the bonding agent is a thermally conductive epoxy.

8. The device of claim 2 wherein the snap-action thermal switch is structured having three terminals being mutually electrically isolated, two of the three terminals being shorted together when electrical contacts mounted on the two terminals are closed; and

the integral electrical temperature sensor is electrically coupled to provide an output on a third one of the electrically isolated terminals.

9. The device of claim 8 wherein a first one of the two terminals is structured for being coupled to a voltage source and a second one of the two terminal is structured for being coupled to a load; and

the integral electrical temperature sensor includes one terminal electrically coupled the first one of the two terminals that is structured for being coupled to a voltage source and a second terminal coupled to the third one of the electrically isolated terminals.

10. The device of claim 9 wherein the integral electrical temperature sensor is selected from a group of electrical temperature sensors that includes a resistance thermal device (RTD), a platinum resistance thermal device (PRTD), a thermistor, a thermocouple, a monolithic silicon temperature transducer, and another equivalent conventional electrical temperature sensor.

11. The device of claim 10 wherein the integral electrical temperature sensor is a monolithic silicon transducer having a substantially linear temperature output.

12. (Amended) A device, comprising:

a switch housing;

at least four terminals that are mutually electrically isolated from the housing;

a first two of the at least four terminals being shorted together when electrical contacts of a positive action thermal switch mounted on the two terminals are closed; and

an integral electrical temperature sensor being electrically coupled between a second different two of the electrically isolated terminals.

13. (Amended) A multiple output thermal detection and protection device, comprising:

a two-terminal snap-action thermal switch structured in a normally open configuration and having a thermally activated snap-action portion that is electrically coupled between two mutually electrically isolated terminals that are both electrically isolated from a housing containing the snap-action portion; and

an electrical temperature sensor that is both thermally and electrically coupled to the snap-action thermal switch.

14. The device of claim 13 wherein the electrical temperature sensor is mounted on an interior surface of the snap-action thermal switch using a thermally conductive bonding agent.

15. The device of claim 13 wherein the electrical temperature sensor is mounted on an exterior surface of the snap-action thermal switch using a bonding agent.

16. The device of claim 13 wherein the electrical temperature sensor and the snap-action thermal switch output a signal representative of temperature using one or more electrical terminals in common.

17. The device of claim 16 wherein the snap-action thermal switch is structured to be normally open at sensed temperatures below a predetermined set point;

the two-terminal snap-action thermal switch includes two terminals that are mutually electrically isolated when the snap-action thermal switch structured in the normally open configuration; and

the integral electrical temperature sensor is electrically coupled across the two isolated terminals.

18. The device of claim 17 wherein electrical contact portions of the two isolated terminals are closed at sensed temperatures above a predetermined set point.

19. The device of claim 16 wherein the two-terminal snap-action thermal switch includes two electrical terminals that are mutually electrically isolated when the snap-action thermal switch structured in the normally open configuration;

the snap-action thermal switch is structured to be in one of the normally open and a normally closed configuration at sensed temperatures below a predetermined set point;

further comprising a third electrical terminal that is mutually electrically isolated from the two electrical terminals of the two-terminal snap-action thermal switch; and

wherein one of the two isolated terminals of the two-terminal snap-action thermal switch is shared by one terminal of the integral electrical temperature sensor, and a second terminal of the integral electrical temperature sensor is electrically coupled to the third electrical terminal.

20. The device of claim 19 wherein the shared one of the two isolated terminals of the two-terminal snap-action thermal switch is structured to be coupled to a voltage source, a second one of the two isolated terminals is structured to be coupled to a load, and the output of the integral electrical temperature sensor is coupled to the third electrical terminal.

21. The device of claim 20 wherein the integral electrical temperature sensor is an electrical temperature sensor selected from a group of electrical temperature sensors that includes a resistance thermal device (RTD), a platinum resistance thermal device (PRTD), a thermistor, a thermocouple, and a monolithic silicon temperature transducer.

22. (Amended) The device of claim 20 wherein the integral electrical temperature sensor is a flat package, two-terminal temperature transducer microchip .

23. (Amended) A multiple output thermal detection and protection device, comprising:

a two-terminal snap-action thermal switch structured in a normally open configuration and having a thermally activated snap-action portion that is electrically coupled between first and second mutually electrically isolated terminals that are both electrically isolated from a housing containing the snap-action portion, the first and second electrical terminals being mutually electrically isolated when the snap-action thermal switch structured in the normally open configuration;

third and fourth electrical terminals that are mutually electrically isolated from the first and second electrical terminals of the two-terminal snap-action thermal switch; and

an electrical temperature sensor that is thermally coupled to the snap-action thermal switch and having first and second terminals that are electrically coupled respectively to the third and fourth electrical terminals.

24. The device of claim 23 further comprising a fifth electrical terminal that is mutually electrically isolated from the first, second, third and fourth electrical terminals; and

wherein one of the first and second terminals of the integral electrical temperature sensor is electrically coupled to the fifth electrical terminal to provide resistance compensation capability.

32. (Amended) A multiple output thermal detection and protection device, comprising:

first and second terminals extending through a substantially planar header and being electrically isolated therefrom;

a first stationary contact adjacent to one end of the first terminal;

a second contact adjacent to one end of the second terminal and being movable between a first position spaced away from the first stationary contact in an open circuit structure and a second position in contact with the first stationary contact in a closed circuit structure;

an upright tubular spacer projecting from the header and surrounding the first and second contacts and the portions of the first and second terminals adjacent to the contacts;

a housing enclosing the spacer, the first and second contacts, and the portions of the first and second terminals adjacent to the contacts, the housing extending beyond the spacer and cooperating with the spacer to form an annular space therebetween spaced away from the contacts;

a bi-metallic disc actuator being structured to change state at a preselected sensed temperature and being captured within the annular space and being responsive to a sensed temperature to change state between a concave and a convex relationship to the electrical contacts, such that the disc actuator spaces the movable contact away from the stationary contact when in the concave relationship and the disc actuator permits the movable contact to contact the stationary contact when in the convex relationship, wherein the disc actuator is structured to be in

one of the concave and convex relationships to the electrical contacts when the sensed temperature is below the preselected sensed temperature;

a third terminal and a fourth terminal extend through the header and each being electrically isolated therefrom; and

an electrical temperature sensor is coupled to the third and fourth terminals in an independent circuit from the electrical contacts actuated by the disc actuator and being structured to provide to provide an independent output representative of the sensed temperature thereon.

33. The device of claim 32 wherein the electrical temperature sensor is one of a resistance thermal device (RTD), a platinum resistance thermal device (PRTD), a thermistor, a thermocouple, and a monolithic silicon temperature transducer.

34. The device of claim 33 wherein the electrical temperature sensor is coupled to each of the third and fourth terminals and to one of the first and second terminals.

35. The device of claim 32, further comprising a fifth terminal extending through the header and being electrically isolated therefrom; and

wherein the electrical temperature sensor is a monolithic silicon temperature transducer being electrically coupled to at least two of the third, fourth and fifth terminals.

42. (Amended) A method for providing thermal detection and protection in a single device, the method comprising:

sensing temperature with an electrical temperature sensor portion of a first circuit that is electrically isolated from a housing supporting the first circuit;

outputting on the first circuit a first signal representative of the sensed temperature;

sensing a predetermined set point temperature; and

in response to sensing the predetermined set point temperature, positively closing a second circuit that is electrically isolated from the housing which also supports the second circuit and outputting on at least one common terminal with the first circuit a second signal representative of the sensed set point temperature.

43. Cancelled.

44. (Amended) The method of claim 42 wherein closing the second circuit shorts the first circuit.

45. (Amended) The method of claim 42 wherein sensing temperature with an electrical temperature sensor portion of a first circuit is operated after positively closing the second circuit.